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ABSTRACT

The use of corrugated cardboard in constructing stage scenery is discussed in this paper. In the first section, both the advantages and the problems associated with using the material are discussed, as are ways to avoid problems. The second section of the paper discusses general methods for preparing corrugated materials for set and prop construction, and offers specific design and preparation directions for using these materials when constructing furniture facades, paneling effects, window mullions, and functional chairs. The final section of the paper offers hints on locating and acquiring corrugated materials. The text is illustrated with 26 drawings. (RL)

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CORRUGATED CARDBOARD SCENERY CONSTRUCTION

by

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A paper

presented to

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Good evening. The idea of building scenery from corrugated cardboard has produced a couple of different points of view from people I have met so far at this convention. One response has been "What can you do with it besides stand it up and paint it?" The other reaction was "Expletive deleted! I was building scenery from that stuff before you were born!"

Those of you who have never used corrugated will hopefully find tonight's program of use to you. You salty old-timers are invited to share your experiences during the time for comments at the end of the program.

The proper name for this material is 'corrugated.' The paper industry frowns on the term 'corrugated cardboard' since they believe that 'cardboard' is the stuff from which cards are made: post cards and playing cards, for example.

You already know about this stuff, whatever it may be called. You find it everywhere. The material comes in a variety of sizes and shapes depending on where you get it. However, its structure makes it unique.

Look at Drawing 1; the end view of a piece of corrugated. You will see a wavy sheet sandwiched between two flat sheets. The waves in the middle sheet act as arches, a common architectural weight-bearing form. The arches, in this case, resist force applied directly to the flat sheets. If you squeeze the corrugated between your fingers, you will notice that takes a fair amount of pressure to squeeze it flat. If you can squeeze it flat, you needn't let your ego get out of hand; after all, it is only paper.

If you turn the sheet of corrugated so that the corrugations are vertical, the center layer acts as a series of columns to resist force applied to the ends. See Drawing 2. Columns are another commonly used architectural form. We find them everywhere in weight-supporting applications. It is possible also to break these paper columns by applying enough force. However, you probably won't be able to squeeze them flat. What will happen is that you will break the column structure rather than squeeze it. Combining several layers of corrugated will allow you to create a structure of surprising strength. The breaking of the column structure becomes more difficult as you add more thickness.

The fact that this material does have corrugations gives it a structure somewhat akin to the grain in a piece of wood. This fact can be used to your advantage -- more about that later on.

There are some problems in using corrugated. After all, it is only paper. If you get it wet, it will turn to mush. If you set it on fire, it will burn. When a sharp object comes in contact with corrugated, the result is usually a hole in the corrugated and no damage to the sharp object.

There are simple common sense ways to avoid the above problems. It is very simple to keep water away from your corrugated stock or scenery. If you are storing a bunch of corrugated, store it up off the floor so that any drainage from the air-handling unit that architects always seem to stick into a corner of the scene shop will not seep into your corrugated and make it soggy and mushy. You should not store your corrugated under water pipes that can drip or that may

have condensation forming on them. If your shop is protected from fire by a sprinkler system and/or if you simply have to store corrugated near pipes, put a sheet of plastic over the corrugated. There's a one in a million chance that the sprinkler system might malfunction and when it does it will put forth an awful lot of water in a very short time. If your corrugated stock is protected by plastic, even that one in a million chance won't harm it, and it will stay in pretty good shape.

Of course, if you don't do dumb things like sticking a match next to your corrugated, it probably won't burn. Of course, there are some people who will stick a match next to your corrugated scenery. If you don't get along with the fire marshal in your locality, he just might do something like that. There are assorted ways to avoid the problem of burning. Any good stagecraft text has that old sal ammoniac recipe for flameproofing solution. There are also a few flameproofing solutions available from the theatrical supply houses which can be applied to your corrugated to reduce its "burnability". Using common sense and keeping a fire extinguisher backstage will go a long way toward eliminating any fire problems.

Of course, the simplest way to avoid the problem of poking holes in corrugated is to keep sharp objects and corrugated apart from each other. That may be difficult if your prop crew is not really coordinated and they have to handle sharp props near corrugated scenery. In that case, lots of slow motion prop change rehearsals may be necessary until the members of the crew get their act together enough to be trusted with sharp objects near corrugated scenery.

Another thing to consider about corrugated is that you need not invest in a lot of 'high-tech' tools in order to work with it. Anything sharp will cut it. The implement known as the matt knife or Stanley knife or carton knife, whatever you wish to call it, will do a perfectly fine job of cutting. Cut-Awl machines and knife blades in sabre saws will do a good job of cutting curves. If you are going to make a lot of straight cuts, you can use that old blade in the table saw - the one that's getting just a little past its prime for cutting wood. That blade is still in good shape for cutting corrugated. It is a little dull, but even if you began with a new sharp blade, the paper would quickly dull it. Remember how your mother would have a fit every time you took the scissors from her sewing basket and cut paper with them? That's because paper will dull a blade very quickly. If you use a blade in a saw until it has passed its prime for cutting wood, you can still get a lot of use from that blade for cutting corrugated. Eventually any blade will become too dull to be used efficiently for cutting anything. At that point, circular saw blades would need to be resharpened and matt knife blades must be replaced. Even then, matt knife blades cost about twenty cents for a double-ended blade, so the cost is not great.

There are times when you will want to cut just one face of the corrugated. This technique is known as scoring, and is done parallel to the corrugations as shown in Drawing 3. It requires a sharp knife blade and light touch. Scoring is necessary when making corners or bending the material. Cut one face and force the cut edges down inside the corrugations. Drawing 4 shows the material bent toward the

cut side so you will have a strong corner. Bend the material away from the cut side and you will have a weak corner as shown in Drawing 5. Several score marks will enable you to bend the corrugated in an arc with no obvious corners as Drawing 6 indicates.

If you want to join two pieces of corrugated so the seam cannot be noticed, you can use the materials known as Kraft paper, or the unwaxed type of butcher paper or plain old brown wrapping paper for a dutchman. If you have someone obnoxious working with you and you want to give them a job to keep them occupied and away from you for along time, you can give them the task of peeling the faces of a sheet of corrugated away from the wavy center layer! That's guaranteed to keep them occupied and you will also end up with a supply of dutchman material which will exactly match the corrugated surface as far as texture is concerned.

Wheat paste or wallpaper paste is not a very 'high-tech' item. However, it is a very good material to use for applying the paper dutchmen. The dutchmen, incidentally, should be ripped, not cut, into strips. Cutting will give you a sharp, straight edge like tape. There are some who will take issue with my point of view, but I do not buy the idea of using masking tape or other tape-type products for dutchmen, because you do get that hard, straight edge which you don't really want to have on a dutchman. After all, the idea of a dutchman is to invisibly cover a joint. Torn edges will blend irregularly into the corrugated's surface when they are pasted down. This irregularity will 'camoflage' the joint.

Increasing the strength of the corrugated material can be done by gluing one piece to another. This can be easily accomplished by using

a substance known as 'polyvinyl resin white glue'. That might sound like its very 'high-tech' and/or very exotic and/or very expensive to use on paper material. Let me give you a common brand name for this stuff; "Elmer's". You can buy Elmer's Glue in the cute little squeeze bottles almost everywhere, but it is much more economical to purchase it by the gallon. Get the nozzle tip to fit on the gallon jug. This will enable you to invert the jug and apply little dots six to eight inches apart over the surfaces you wish to join together. The 'dotting' technique is preferable to smearing a coat of glue over the entire surface because the latter technique runs a good risk of causing the corrugated to warp.

After applying the dots of glue, put the two surfaces together and put a little weight on top to ensure a good contact. Within an hour, perhaps within a few minutes, the corrugated layers will be 'set' enough so you can remove the weight and go on to something else.

Painting corrugated can lead to some problems if you don't really understand paper scenery. However, it can be successsfully painted by using any common scene paint.

Dilute the scene paint to approximately two-thirds of its regular strength. If you mix your scene paint 'from scratch' and you normally mix your size water in a one part glue to fifteen parts water, try a twenty-two or twenty-three parts water to one part glue size water and then add your pigment. If you have a gallon of regular scene paint properly mixed from a concentrate, add enough water to make a gallon and a half of paint for applying to corrugated. The point of diluting the paint is that the less binder in a given quantity of paint, the

less risk you run in warping the corrugated as the paint dries. You really need just enough binder to keep the pigment attached to the surface. Corrugated is a porous surface and will absorb the paint pretty well, so you really don't need a great deal of binder. Of course, if you rub a surface on which the paint has dried and the pigment comes off on your hand, there wasn't enough binder used.

There are a couple of common techniques which can be used to apply the paint to the surface. A dry-brush technique is familiar to everyone, I'm sure. Begin by covering about a quarter of the total surface at a time. Let that dry, and cover another quarter. After four applications, the entire surface should be covered as shown in Drawing 7. If you are after a solid coat or a wood-grain effect, this works nicely. The point is that each application of paint will dry on a relatively small proportion of the total area, and will not be enough to cause any warping problems.

The same principle is used when applying the paint using a spattering technique. A quarter of the total area is covered, allowed to dry, and another application is spattered on. See Drawing 8. However, the spattering technique has a certain characteristic that may work for you or against you, depending on what you desire as a final effect. If you want a textured look with a bit of the corrugated color showing through, this will work marvelously. However, if you think you can get complete coverage by scattering little dots of paint randomly over the surface, you'll be still working at this next year. Parts of the surface will have collected enough dots of paint so they will have built up to an inch thick, and there will still be

places on the surface where no dots have landed! For an absolutely completely covered surface, use the dry-brush technique.

You can also overcome the problem of warping in other ways. Put the corrugated on a frame, like a flat frame. That way, it won't be able to warp -- at least not much. But don't glue it on. Gluing the corrugated to the frame will give you a nice strong joint. However, when you try to remove the old, used, battered corrugated from the frame, you will find that it won't come off and you'll have to throw the whole thing out, frame and all. Staples or tacks are best. After all, it just needs to be held firmly on the frame. The staples or tacks can be easily driven in and easily removed.

Another way of overcoming warping is to paint the corrugated on both sides. The warps will cancel each other out. Put the nice solid coat of paint on the back side first, then, while the back side is still wet, paint the front side. When the paint has dried, the corrugated will be relatively flat.

However, it is possible to 'build in' warps for some purposes by painting appropriately. For example, if you were to need a number of shields for a group of warriors who appear briefly onstage, you could cut the blanks from corrugated stock. When one side is given a thick coat of paint, the binder in the paint will cause the corrugated to warp so that the painted side becomes concave. All of the shield blanks will warp to the same degree. The addition of a couple of arm straps to the concave side and appropriate decorations to the convex 'outside' of the shield will give you an inexpensive item which can be 'mass-produced.'

If the warriors are to carry halberds, corrugated blades can be cut to the appropriate shape, spray-painted silver and attached to long wooden shafts or dowels. Even stylized helmets could be made from corrugated and a bit of ingenuity.

Corrugated can also be used for other purposes. It can be used as a lightweight but stiff backing for various scenic pieces which need support. If you have a bookcase in your set, you would need books to fill most of the shelves. Real books are heavy and will cause problems with swift scene changes. However, when a book is in a bookcase, usually only the spine is seen; therefore, you don't need the entire book. Check with your local library and see if you can get some dust jackets from the paper covers on new books. Libraries usually throw these away when they put the books on the shelves. Cut the spines from the dust jackets and paste them to a sheet of corrugated which is as wide as the shelves of your bookcase. Cut the corrugated around the top edges of the dust jacket spines, tack a piece of 1" x 3" on the bottom of the back for stability, and you have a lightweight and inexpensive shelf of 'books'. You may have to tone down your 'books' since dust jackets are usually more colorful than book bindings.

Corrugated can also be used in the creation of furniture. An ugly straight-legged table can be converted into a 'period' table by the addition of corrugated cabriole legs. See Drawings 9 and 10. The apron of the table (that piece of wood between the legs and the top) can also be altered. Since we initially recognize most objects by their silhouettes, changing the silhouette will change the audience's perception of the period of style of the furniture.

The corrugated legs and apron of a table can be painted or stained to match the top. They can also be covered with wood-grained contact paper. The legs should be cut 1/8 inch shorter than the legs of the table. This will ensure that no weight is placed on the corrugated legs causing them to buckle.

When the legs and apron have been cut and painted or covered appropriately, they should be attached to the real legs and apron of the table. Use large-headed carpet tacks. The tacks are easier to control than staples and their heads can be painted or covered with scraps of contact paper.

Since the alterations to the table are obviously two-dimensional, the completed table should be used in a situation where the audience can only see it directly from the front. Against the back wall of a box set is a good place. If the audience can see it from the side or from the rear, the illusion you have worked hard to create will be destroyed. However, from the front it will look marvelous.

The same alteration-of-silhouette technique can be used on chairs, cabinets, bookcases, or any other piece of furniture which is seen only from the front of your set. You can even build the weight-supporting skeleton of the furniture piece from woodshop scraps and merely provide the cosmetic touches with corrugated.

Corrugated can be used to create silhouettes of all types. The material is strong enough to be cut into all sorts of shapes without a great deal of additional support as long as it is not creased or bent. Mullions in a window can quickly be made from corrugated. Ground rows, wall decorations of all sorts, tree limbs with or without leaves, and

false proscèniums are just a few exampies of situations where corrugated silhouettes can be used to your advantage.

Several layers of corrugated can be glued together to build up a thickness, if that is important. For instance, the mullions in a window can be made thicker by using three or four layers of corrugated. When they are viewed closely, the corrugations in the edges can be seen, but from a few feet away they will not be apparent but the thickness will still be noticeable.

These mullions can be straight, as most of them are, separating rectangular panes of glass. They can also be curved in a fan shape for the top of windows in an arch or they can sometimes be irregular as in some stained glass windows. Whatever their shape, you can cut them from corrugated. Beginning with a sheet of corrugated the size of the window is easiest, although you can piece together smaller pieces if the window is large. When you have determined the pattern of mullions and 'lights' (the open places where the glass would be in a real window) carefully cut out the lights and save the pieces. You should now have the desired silhouette of your window. It will probably be a bit flimsy but you can add strength and thickness by cutting out three or four sets of mullions and gluing them together. When you have the first set of mullions cut, you can trace subsequent sets from it and save a lot of time and effort. The bottom line is that this type of construction from corrugated can be done faster, less expensively, and by those with less skill than building the same mullions from wood.

The idea of using several layers of corrugated to build up additional depth or thickness can come in handy when you wish to do actual

three-dimensional work, One of the most visually effectively three-dimensional uses of corrugated is for panelling. It is possible to achieve depth variations in corrugated panels which will make a "wood-paneled" wall look like a million dollars. All that is required is some planning and some good wood-painting technique.

The basic technique is to use the material in successive layers. Each layer must be thick enough so that its depth is noticeable from the audience; at least one inch thick. Four layers of corrugated glued together will provide approximately a one-inch thickness which can be noticed from the audience.

Consider a simple panel as being made of three layers, X, Y, and Z, as indicated in Drawing 11. Layers X and Y are cut to the size of the area to be panelled. Layer X has its center section removed carefully so it is undamaged and the section is saved. It will become layer Z. A smaller section is removed from Layer Y. Layer Y is then fastened in place behind Layer X. Layer Z is fastened behind Layer Y to complete the panel as shown in Drawing 12.

These drawings show only a three-layer panel. You can, of course, use as many layers as you need. It's also possible to reverse the procedure at some point and build the panel back toward the front. The possibilities for variations in light-weight and inexpensive panel design are limited only by the designer's imagination.

Corrugated can also be used to give apparent thickness to areas such as door jambs, window jambs, or arches. A single piece of corrugated can be tacked in place as shown in Drawing 13 to give the impression of depth or thickness.

Corrugated can be used to create free-standing three-dimensional pieces of scenery such as beams or columns. Large square beams can be made long enough to span the stage or project out over the audience. Make the beam from two thicknesses or corrugated as shown in Drawing 14 When the two thicknesses are glued together, the beam will retain its three-sided shape because, in order for the structure to unfold, the two thicknesses would have to slide past each other. Three sides are sufficient, since your audience will not see more than two. Placing a 1" x 2" every few feet across the open side will help the beam retain its shape as well as giving you something to grasp while moving it or to which you can attach wires for suspension purposes. If your set design requires an upper level to be supported by massive beams, use pipes or 4" x 4" to bear the actual weight and place your corrugated beams around them to give the illusion of massive beams.

Long beams will probably require several pieces of corrugated to be joined end-to-end. Since the material is light in weight, such joints can be accomplished by making sure that the joints in the inner layer are at least several inches away from the joints in the outer layer. Each joint will be glued tightly to a solid piece of the other layer. Joints on the outside layer must be dutchmanned.

Columns can be built by curving the corrugated around circular sweeps cut from plywood. The corrugated sheets should be scored parallel to the corrugations an inch or two apart. The edges of the scores should then be pushed into the corrugations slightly and the scored side will become the interior of the column. This will allow the uncut side of the corrugated to be the outside of the column.

Two layers of corrugated will give the column greater strength as well as allowing joints to be overlapped.

Tapered columns can be simply made by using large sweeps at one end and smaller sweeps at the other.

Tree trunks are essentially columnar in shape. Branches can be attached by merely cutting a hole in the side of the column and inserting the butt end of the branch. The branches themselves can be real ones cut from a tree or they can be tightly rolled pieces of corrugated. The latter can be slit at the tip end and the strips of corrugated pulled and twisted to give the necessary effect of twigs.

Corrugated can also function as a weight-bearing material. It obviously will not be as strong as steel or wood, but it will be a good deal lighter. At times, this can be very important.

There are many weight-bearing shapes or types of structures. The simplest is the cube. It has six equal faces and all corners are square. Further, when you have mastered the building of a simple cube it is very easy to use the same principles to expand the application in various directions for different purposes. The cube shape expanded vertically will result in a square column or pillar. Expanded horizonally, the cube shape becomes a platform.

If a cube were built from a solid piece of material, it would support weight equally well in all directions. However, since you are working with a material which is inherently stronger in one direction cubes should be planned with a definite top and bottom.

The top and bottom faces will have to bear the load which is applied to the flat surfaces as shown in Drawing 1. It was also

mentioned earlier that corrugated has a 'grain' similar to wood. You can greatly increase the strength of the corrugated by laminating several thicknesses together in the same way playwood is constructed. The first layer of corrugated has its corrugations running North/South; the second layers runs East/West, as shown in Drawing 15. Using the 'dotting' technique of applying glue between layers, four thicknesses of corrugated should be sufficient for the top and bottom faces of a cube up to two feet on a side.

The four sides of the cube should be assembled with the corrugations all running vertically. There will be very little pressure applied to the sides of the cube, so it is not necessary to criss-cross the corrugations in the sides. Instead, virtually all of the weight will be applied to the ends of the columnar structure as shown in Drawing 2. Again, for a cube up to two feet on a side, four thicknesses of corrugated should be sufficient.

You can save yourself a great deal of aggravation if you build the four sides of the cube as a single unit which can be folded as shown in Drawing 16. If you have ever tried to keep all six sides of a cube perfectly aligned during the time it takes for the glue to set when you only have two hands and two feet available for the job, you will understand why it is much easier to fold one completed piece.

The addition of interlocking diagonal braces as shown in Drawing 17 and 18 will help resist any diagonal forces as well as assist in the support of the center of the top face. If a handle hole is cut into the center of the top of the cube, it will also be necessary to

to cut a notch in the center of the interlocking pieces to allow your fingers to get inside.

The completed cube can be covered with fabric, foil, contact paper, wallpaper, or whatever may be appropriate for your use. It is also possible to paint it, using techniques which were discussed earlier.

Actors may sometimes be a bit reluctant to accept anything made from corrugated as being safe to stand on. (After all, its only paper!) However, a sixteen-inch cube, made from corrugated as I've just described, has supported over 400 pounds. The weight of the cube was only seven pounds, one-third the weight of a similar cube built from plywood and designed to support the same weight.

Corrugated weight-bearing construction is not limited to columns, pillars, cubes, and platforms. The same principles can be used in the construction of corrugated furniture.

However, for any corrugated furniture that is sturdy enough to support the weight of an actor, you must think in terms of a massive, modern style which has no legs. The seat platform must go all the way to the floor. If there are arms or a back, they must be an integral part of the structure, not just something added to the seat.

This kind of furniture construction is exemplified in the designs for corrugated chairs done by three architecture students at Louisiana State University. Drawings 19 through 21 illustrate Nam Nguyen's chair which was constructed in two parts. The base was formed from an interlocking corrugated grid and was covered with a single layer of corrugated. The arms, back and seat were also formed using the interlocking grid principle. The grid pieces which ran from front to back of

the seat were extended to form the back of the chair. The grid pieces which ran the width of the seat were extended to form the arms. Finally, a double layer of corrugated was used to cover the contours of the back and the seat. The layers of corrugated covering the back, seat, and base also served to increase the stability of the interior grid. When the arms/back/seat portion was glued to the base, the Nguyen chair proved to be very sturdy.

A rigid triangle shape was the basis for another corrugated chair design. Julia Hinton formed her design from two thirteen-foot-long strips of triple thickness corrugated. These were folded and interlocked to form the 'accordian-style' structure as shown in Drawing 22. Triple-thickness corrugated pieces were folded into prism shapes and attached to the top and bottom. This resulted in a smooth top and bottom surface and no further covering was necessary.

The principle of a column was used for a third type of corrugated chair. Charles Corley's cylinder chair began with two patterns like that in Drawing 23 being cut from corrugated. After being scored, these pieces were formed into a cylindrical shape around a round base as shown in Drawing 24. A second, smaller cylinder was formed by the above method and was placed inside the first as in Drawing 25. This process continued until seven concentric cylinder shapes had been assembled. At that point, a cover was placed over the assembled cylinders as shown in Drawing 26, and the Corley chair was complete.

The Nguyen, Hinton, and Corley chairs could be expanded to form couches. The first two designs would only require an increase in width. The Corley design would perhaps need three or four sets of

concentric columns placed side by side on a common base and supporting a common seat surface.

These are just three possibilities for chair/couch designs. You can develop other designs perhaps more suitable to your specific needs. Keep in mind that the seat platforms must extend all the way to the floor and that the arms and back must be integral parts of the structure.

In order for you to make use of this versatile material in any of the ways previously described, you must first find a source of corrugated. These sources fall into three basic categories: corrugating plants, box manufacturers, and any place which is discarding previously used corrugated in good condition.

The best corrugated you can get will come directly from the factory. If you have a corrugating plant or converter in your area, contact them directly. It is possible that you may be able to buy a quantity of brand new corrugated sheets up to ten feet long. Be aware that you may have to buy ten thousand square feet or more at one time in order to do business directly with the manufacturer. On the other hand, you may be able to deal for much less, so don't be afraid to contact the factory directly.

If you have to buy a quantity larger than you need, or can afford, get in touch with other school departments, community theatres, or other organizations. Even call the garden clubs or agriculture departments; corrugated cardboard makes a great mulch. Some stable owners find it useful for the bottom layer of bedding in stalls. This use will, of course, increase its value as mulch! Somewhere there must be

someone who will split the cost of an order with you. Use your imagination to find them.

The second best corrugated will also be at the factory. When you call to ask about buying new material, ask about the possibility of obtaining scrap material. Something like large box blanks on which the printing is crooked may be junk to them, but a bonanza to you, particularly if you can get the blanks for nothing, and you usually can. Perhaps they may have nothing at the moment but will save some scrap material for you if they know you want it.

A third source is the box manufacturing companies. They may buy the blanks from the corrugating plants and act as a retail outlet. Again, their trash may be your treasure. It is possible that the box companies may have large sheets on hand for custom-building packing material. Quantity purchasing may be necessary at these sources, too, but they probably will accept much smaller orders. You'll never know unless you try.

Source number four is second-hand material. Just because someone has already used the corrugated for something does not necessarily destroy its value to you. It is very possible that you may find better and larger pieces of undamaged corrugated in a trash pile than anywhere else. This does not mean that you should rummage around in a dump among malodorous substances and creepy-crawlies to find the second-hand material. Call a furniture store. Stoves, washing machines, dishwashers, dryers, sofas, chairs, refrigerators, freezers and other items come in cartons which are large enough to yield lots of good corrugated. The trash heaps at most modern furniture and appliance stores consist

only of a variety of paper and/or packing products; nothing to attract bugs or varmits. Furthermore, they are usually cleaned up completely at least once a week. If you get permission to raid such a source, do it during a period of dry weather. Corrugated which has been subjected to a rain, heavy dew, or even continued high humidity will be less than perfect, sometimes no more than a pile of pulp. Obviously, the best time to make use of this source is when the furniture is being unpacked. As soon as the furniture is out, grab the carton, slice open the seams necessary to get it to fold as flat as possible, toss it in the back of a pickup or station wagon, and go back for the next piece.

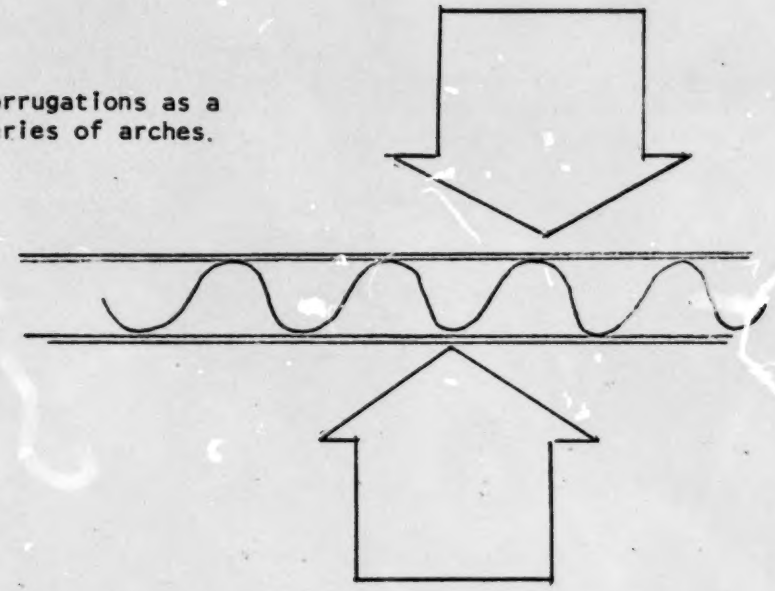
Finding the types of sources listed above is quite simple. Go to your local library and consult the Thomas Register for paper industries in your area. Other directories of the paper products industry include Lockwood's Directory, The Paper Yearbook, Post's Pulp and Paper Directory, and Walden's ABC Guide. Any of these should be able to help you locate sources of corrugated in your area.

Don't forget to look in the Yellow Pages! This modern compendium of information contains pertinent headings such as "Boxes", "Containers," "Packaging," and "Paper." "Furniture" and "Appliances" may also prove useful.

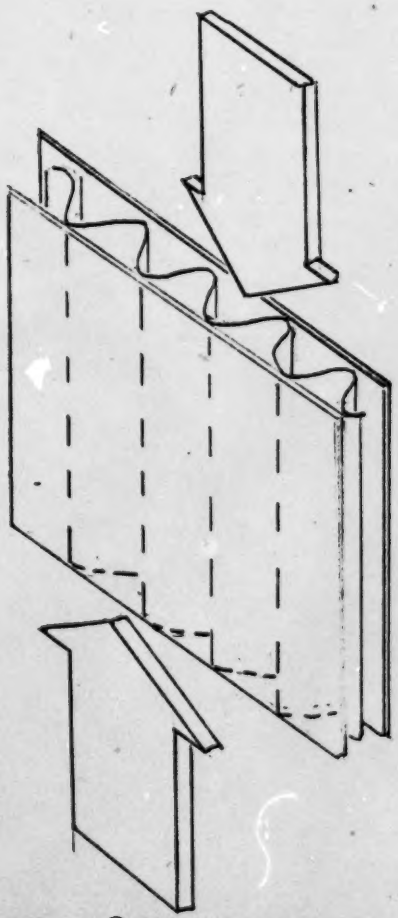
If you don't have a budget for scenery, if your budget needs to be stretched, or if you just want to try something different, consider using corrugated cardboard as a scenic material. It may not replace the traditional scenic materials or the new space-age scenic materials, but it may be exactly what you need in certain situations.

DRAWINGS

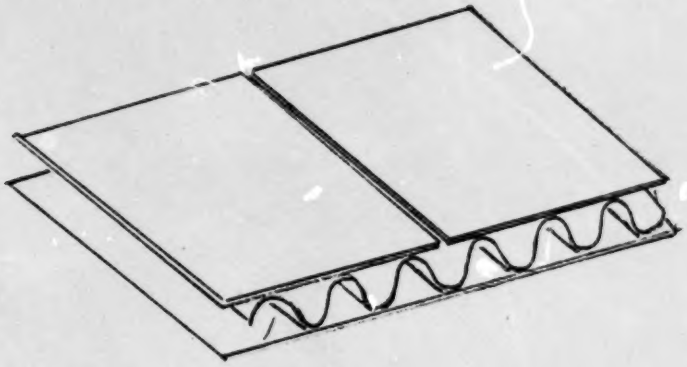
1. Corrugations as a series of arches.



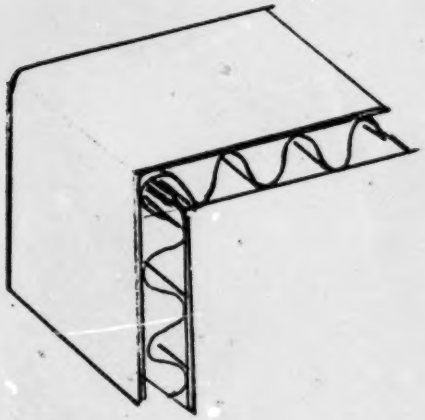
2. Corrugations as a series of columns.



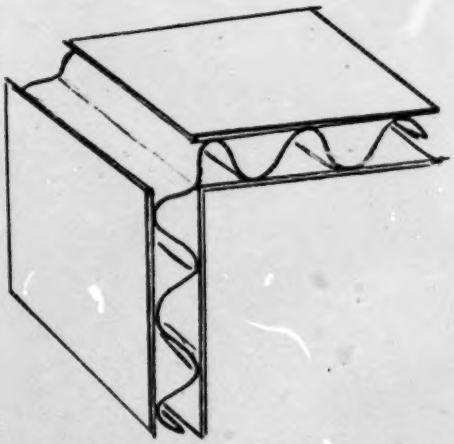
3. Score only one side on 'valley'.



4. Folding toward scored side results in a strong corner.



5. Folding away from scored side results in a weak corner.



6. Arrows indicate scoring on inside of curve.

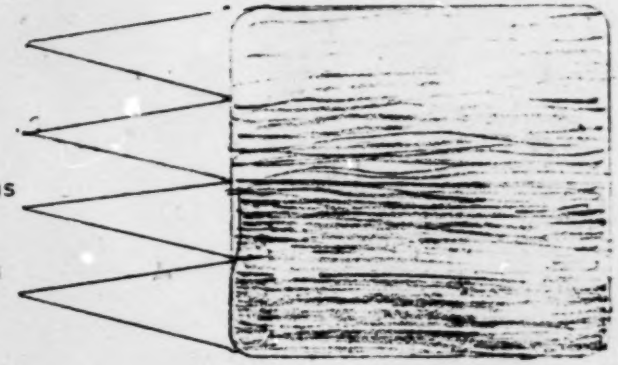
7. Dry-brush technique

One application
25% coverage

Two applications
50% coverage

Three applications
75% coverage

Four applications
100% coverage



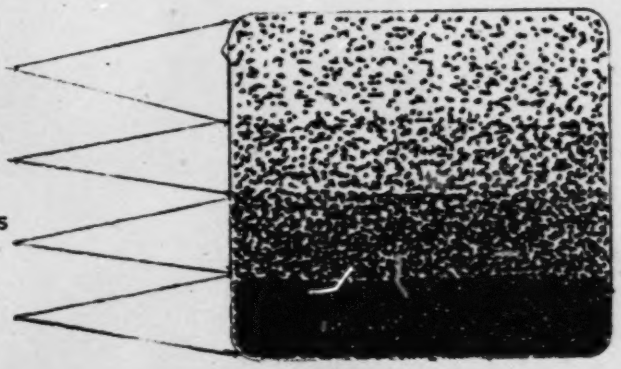
8. Spatter technique:

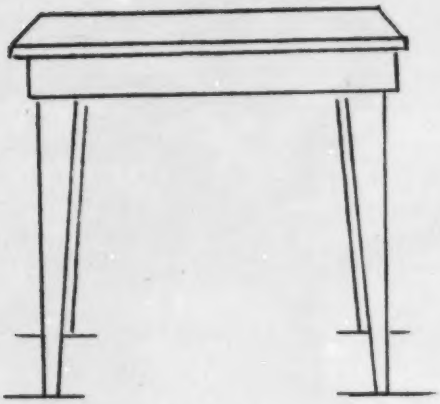
One application
25% coverage

Two applications
50% coverage

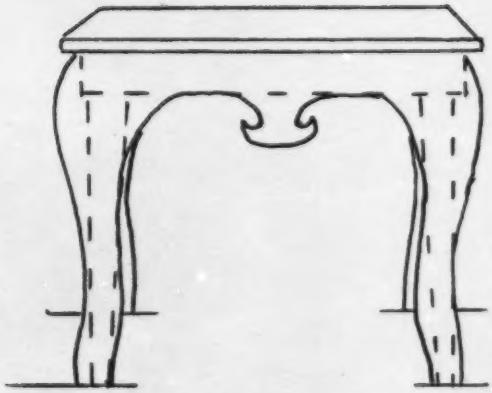
Three applications
75% coverage

Four applications
99% coverage



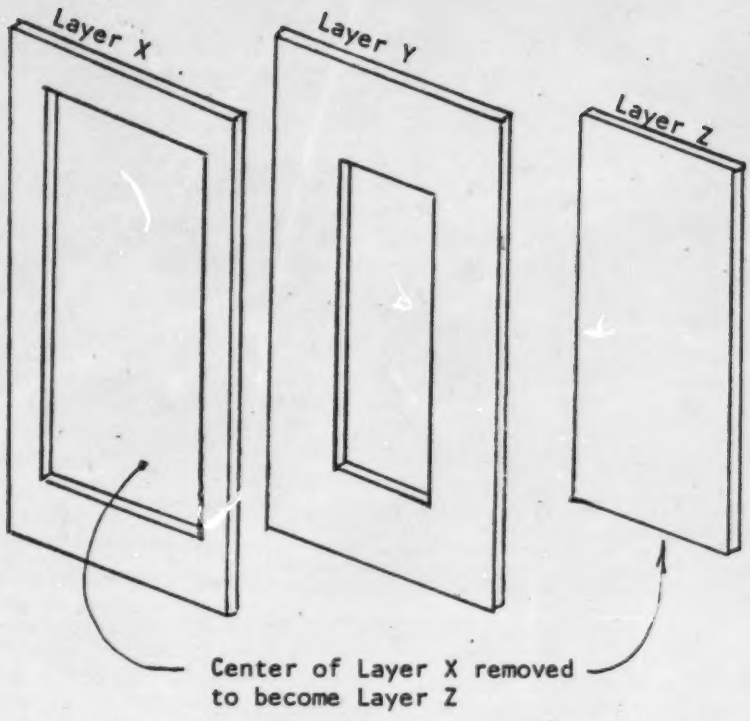


9. A plain old straight-legged table.

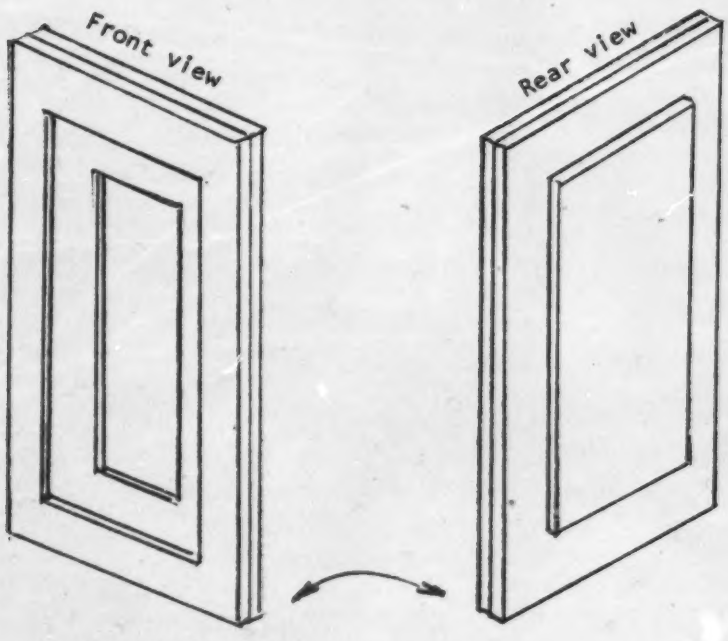


10. A 'period' table created by the addition of corrugated legs and apron.

11. A three-layer corrugated panel (exploded view).

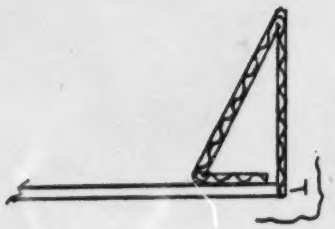


12. Completed panel.



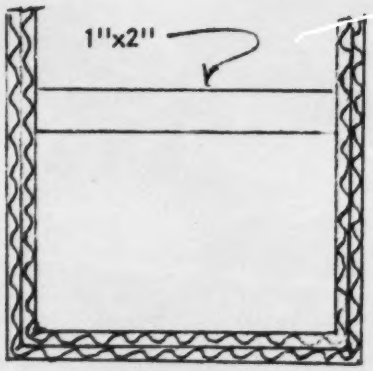
13. Top view of thicknesses pieces:

Single layer tacked to edge of flat opening with dutchman on corner.

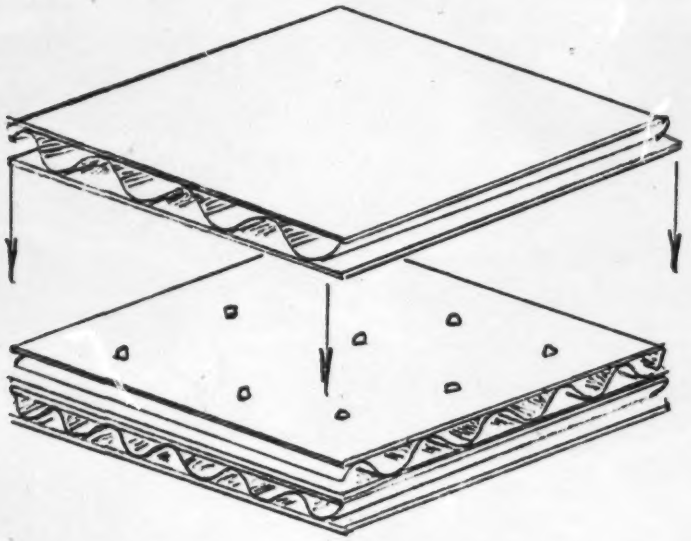


Single layer folded for additional strength.

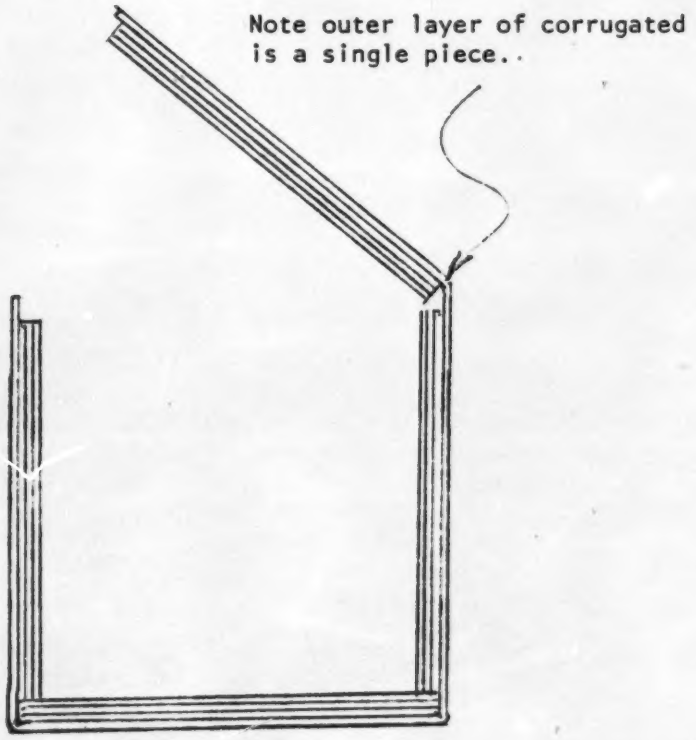
14. End view of beam.



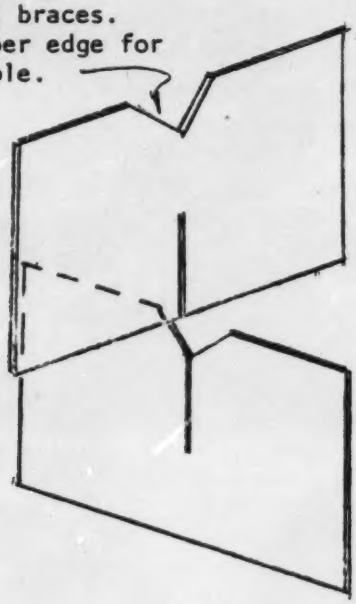
15. Laminating layers of corrugated by criss-crossing directions of corrugations for additional strength.



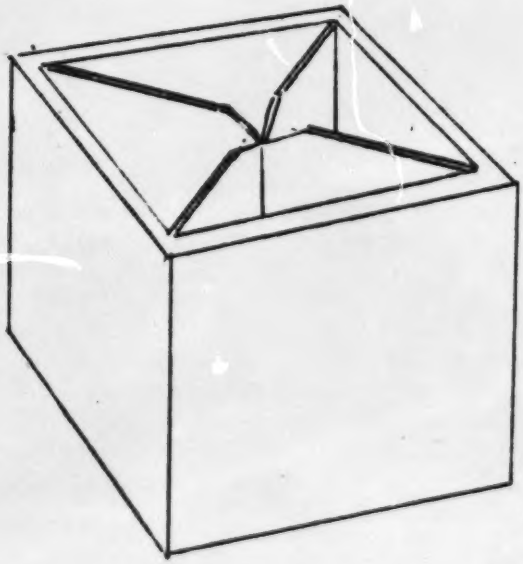
16. Top view of cube's sides built as a single single unit which folds.



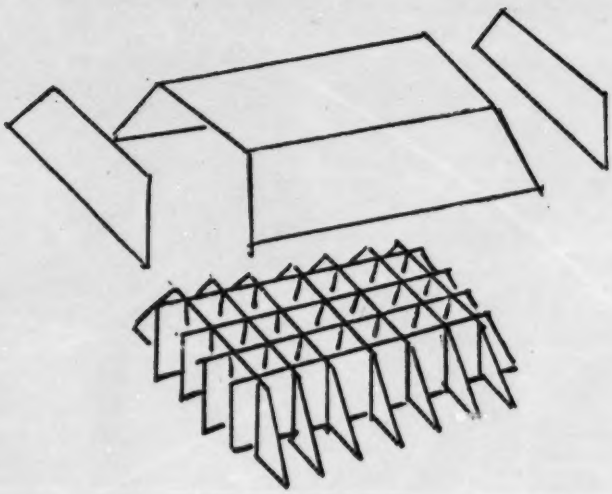
17. Interlocking diagonal braces. Note notch cut in upper edge for space below handle hole.



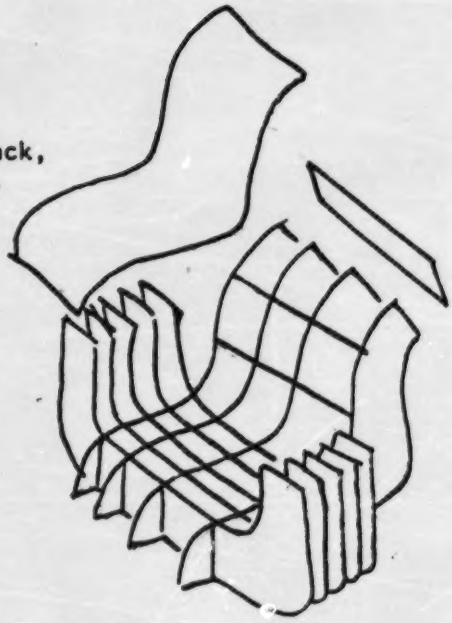
18. Interlocking diagonal braces installed inside cube.



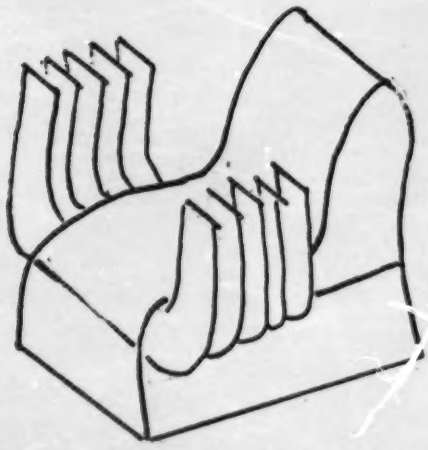
19. Exploded view of base of Nguyen chair.



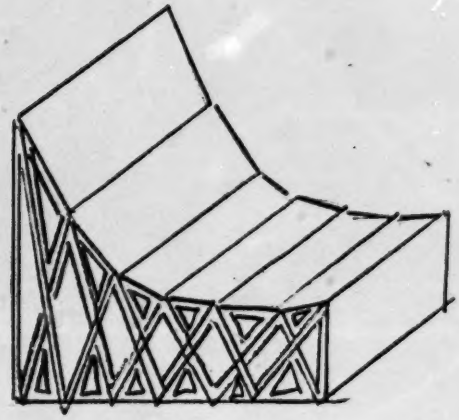
20. Exploded view of arms, back, and seat of Nguyen chair.



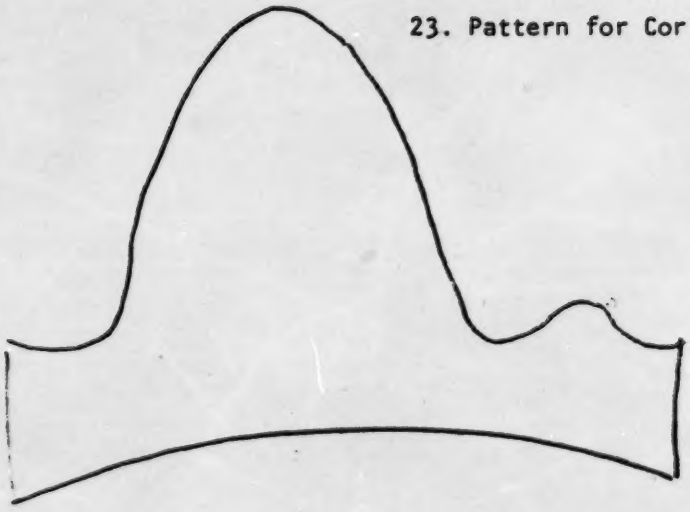
21. Assembled Nguyen chair.



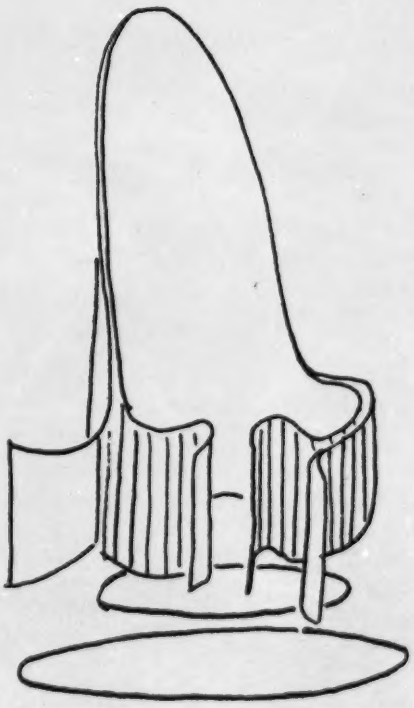
22. Hinton chair.



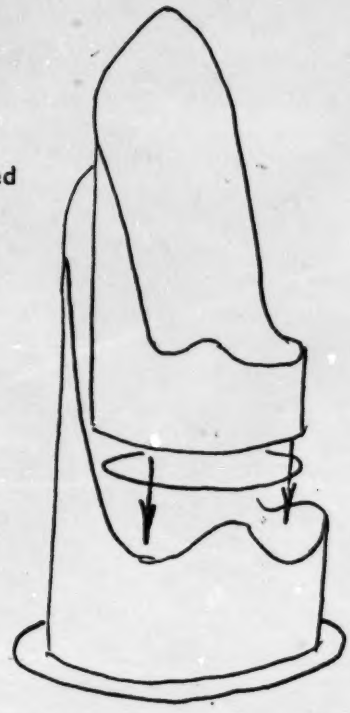
23. Pattern for Corley chair.



24. Double thickness corrugated formed into cylinder around circular base.



25. Smaller cylinder installed inside first cylinder.



26. Cover added over assembled cylinders.